50p

Aus & NZ $1.50 SA R1.50 US $1.50

THE Unexplained

MYSTERIES OF MIND SPACE & TIME

Odd animal senses
Who was Kaspar Hauser?
Alchemy's hidden truth
The test of healing
Epidemic of vampires

51

THE Unexplained
MYSTERIES OF MIND SPACE & TIME

Published weekly by Orbis Publishing Limited
Orbis House, 20/22 Bedfordbury, London WC2N 4BT

Volume 5 Issue 51

Contents

Picture acknowledgements
Cover: Photri; Jean-Loup Charmet (inset); **1001:** Michael Holford (t); Jean-Loup Charmet (b); **1002:** Topham; **1002–1003:** Jean-loup Charmet; **1003:** Mary Evans Picture Library; **1004:** Werner Forman Archive/Berlin Museum of Ethnology (tl); Jean-Loup Charmet (tr); Robert Estall (b); **1004–1005:** Kobal Collection; **1005:** Popperfoto (c); D. Farson (b); **1006:** Popperfoto (t); B.R. Grad (b); **1007:** Jean-Guy Thibodeau (t); B.R. Grad (b); **1008:** B.R. Grad; **1009:** artwork by Studio Briggs; **1010:** Bruce Coleman/Hans Reinhard (t); Science Photo Library (b); **1011:** Bruce Coleman/Dr. F. Sauer (l); Oxford Scientific Films (r); **1012:** Michael Holford (t); Dr. Robin Baker (c and b); **1013:** Bruce Coleman/Prato (l); Oxford Scientific Films (r); **1014:** Jean-Loup Charmet (t); Robert Hunt Library (bl); Süddeutscher Verlag (bc and br); **1015:** UKAEA (c); artwork by Studio Briggs (b); **1016:** Boyer-Viollet (l); **1016–1017:** The British Library; **1017:** Jean-Loup Charmet (b); **1018:** Contemporary Films (t); Bildarchiv Preussischer Kulturbesitz (b); **1019:** Contemporary Films; **1020:** Bildarchiv Preussischer Kulturbesitz (t); Süddeutscher Verlag (c); **back cover:** Spectrum

The Unexplained Price U.K. 50p. Aus. & N.Z. $1.50. S.A. R1.50. U.S.A. $1.50.
How to obtain copies of The Unexplained Copies are obtainable by placing a regular order at your newsagent, or by taking out a subscription.
Subscription Rates
For six months (26 issues) £15.00, for one year (52 issues) £30.00. Send your order and remittance to The Unexplained Subscriptions, Punch Subscription Services, Watling Street, Bletchley, Milton Keynes, Bucks MK2 2BW, being sure to state the number of the first issue required.
Back numbers
U.K. & Eire: Back Nos are obtainable from your newsagent or from The Explained Back Nos. Orbis Publishing Ltd, 20/22 Bedfordbury, London WC2N 4BT – 50p each, post free.
Australia, New Zealand, South Africa, Europe & Malta: Back Nos are available at cover price from your newsagent. In case of difficulty write to the address in your country given for binders. South African readers should add sales tax.
How to obtain binders for The Unexplained
U.K. and Eire: Send a cheque/postal order for £3.25 per binder (incl. p & p) payable to Orbis Publishing Ltd to: The Unexplained Binders, Orbis House, 22 Bedfordbury, London WC2N 4BT. Please state the volume numbers required.
Australia: Binders are available through your local newsagent price $7.25. In case of difficulty write to The Unexplained Binders, Gordon and Gotch (Aus) Ltd, 114 William Street, PO Box 767G, Melbourne, Vic.·3001.
New Zealand: Write with remittance of $7.08 plus $1.30 sales tax per binder to The Unexplained Binders, Gordon and Gotch (NZ) Ltd, PO Box 1595, Wellington.
South Africa: Binders are available through your local newsagent or through any branch of Central News Agency, price R5.75, (please add sales tax). In case of difficulty write to The Unexplained Binders, Intermag, PO Box 613 Cape Town, PO Box 938 Durban or PO Box 10799 Johannesburg.
Europe: Write with remittance of £4.00 per binder (including postage and packing) payable to Orbis Publishing Ltd, to The Unexplained Binders, Orbis Publishing Ltd, 20/22 Bedfordbury, London WC2N 4BT, England, being sure to state the volume number(s) required.
Malta: Binders are obtainable by ordering from your local newsagent price £3.25. In case of difficulty write to The Unexplained Binders, W.H. Smith–Continental Ltd, Po Box 272, 18a Scots Street, Valletta.
NOTE: Binders and Back Numbers are obtainable subject to availablity of stocks. Whilst every attempt is made to keep the price of issues and binders constant, the publishers reserve the right to increase the stated prices at any time when circumstances dictate. Binders depicted in this publication are those produced for the **U.K. market only** and may not necessarily be identical to binders produced for sale outside the U.K.

Fear of the undead

Are all vampire stories the stuff of nightmares or horror films? DANIEL FARSON provides plentiful evidence to prove that the fear of vampires, at least, is as real today as it has ever been

Left: an ancient Tibetan mask in the shape of a devil's face. The mouth is a receptacle for human blood

BELIEF IN VAMPIRES seems, at first, to be the most far-fetched of superstitions. Ghosts and even werewolves seem relatively rational compared to the idea that corpses creep from their coffins at night to suck the blood of the living, yet legends of vampirism have persisted since the beginning of time and still hold sway today.

The problem that surrounds the legends and belief in vampires is sorting out the fantasy – and to some people that is all there is – from the truth. A rational person might be forgiven for viewing the search for 'real vampires' with more than a little scepticism – for how can there be such creatures? Are they not just figments of the imagination?

Yet there exist reports from Eastern Europe that, in the 18th century, vampirism had reached almost epidemic proportions. The documentation is so detailed, and the witnesses included reputable people such as clergymen and doctors, that it seems impossible that every man was mistaken. But again, the sceptic might point out that 18th-century clergymen may have been telling the truth as they saw it, but the truth had become hopelessly confused with fear, superstition and ignorance. And before we dismiss vampirism as a relic of the dark ages, perhaps we should consider the modern controversy over what constitutes the state of death. If, with the most technologically advanced equipment at our disposal, we still cannot agree on the precise moment of death, then perhaps we should not overlook those vampire reports of 200 years ago. There must be some underlying truth in them – but what?

Left: *The vampire's kiss* by Biegas, 1916: the vampire 'red in tooth and claw'

According to the records, Austria, Hungary, Yugoslavia and Romania (which was then divided into the three separate states of Wallachia, Moldavia and Transylvania) were particularly infested with vampirism in the 16th, 17th and 18th centuries. It was a huge

problem that involved hundreds of eyewitnesses from all classes of life. One surgeon, called in to investigate a series of cases, wrote:

> Vampirism . . . spread like a pestilence through Slavia and Wallachia, causing numerous deaths and disturbing all the land with fear of the mysterious visitors against which no one felt himself secure.

Most of the cases reported from these areas at that time showed common features: one classic account concerns a deputation that set out from Belgrade in 1732 to investigate the alleged vampire who was said to be systematically attacking a family in a remote village. When the investigating officers arrived – including some men of impeccable standing such as the public prosecutor – they were told that a villager, who had died three years earlier, had come back as a vampire to terrorise his own family. He had already killed three nieces and one nephew by draining them of their life blood, and would have killed his fifth victim – another, beautiful niece – had he not been interrupted and forced to flee into the night.

The deputation of officials and what was left of the terrified family duly gathered round the 'vampire's' grave as darkness fell. When they opened the coffin they found, to all outward appearances, a sleeping (or perhaps unconscious) man. He should have decomposed long ago; instead he looked as healthy as any of those standing around his grave. His hair and nails were long, his eyes half open – and his heart was still beating. Tradition was upheld: the heart of the 'undead' was pierced through with a stout iron stake. A horrible mixture of white fluid and what looked like fresh blood gushed out. But the task had to be finished; they cut off his head with an axe and buried the grisly remains in quicklime.

Another vampire story from that place and time described how a young Hungarian soldier, billeted on a farm, was greatly disturbed by the reaction of the family he was staying with when, during supper one evening, an old man came in from the dark and sat down to the meal with them. When he touched the farmer on the shoulder the family seemed out of their wits with fear. The next day they told the soldier why. During the night the farmer had died, claimed, they said, by the man who had so lightly touched him – his father who had been dead for 10 years. This was no mere ghost, the bereaved family insisted, but a vampire. Impressed by what he had seen and heard, the soldier told it to his regimental officer, who ordered the old man's grave to be opened up. The previous night's unwelcome visitor lay there like a man newly dead but his veins contained blood 'like a living man'. His head was cut off and his body laid to rest, this time for good.

A deadly cure

Although the cure for vampirism differed slightly from area to area it was always drastic and never to be undertaken by the squeamish. The favourite technique was to plunge a wooden or iron stake through the alleged vampire's heart (a method also used in Britain to stop the ghosts of suicides wandering at night). Not surprisingly, the staked vampire frequently gave off a disgusting stench and one report described a corpse that was 'puffed up and bloated like a great leech ready to burst'. The normal processes of decomposition, with which most modern readers are unfamiliar, would account for both foul odour and grotesque swelling,

Above: a French illustration from the 1830s shows 'vampires' feasting off a corpse. Their hideous cravings are more typical of the *ghoul*; vampires drink blood from the living, and corpses do not bleed

Left: an artist's impression of the attack on a Victorian girl by the 'vampire of Croglin Grange'. Her brothers chased the skeletal fiend but it escaped, to return a year later. This time the brothers managed to shoot it, finally running it to earth in the local graveyard

Right: the burial of a suicide, 1836. They were buried at crossroads and their graves spiked with crosses to prevent them 'walking'

although superstitious peasants, terrified beyond reason, might not stop to consider this fact before dealing summarily with the 'vampire'. Again, another report stated that 'a quantity of fresh scarlet blood issued, and from the nose and mouth as well as from that part of his body which decency forbids me to name.' Yet those who are acquainted with the physical effects of death – nurses, morticians, and executioners among others – know full well that such discharges are not uncommon when the muscles relax after death, either before rigor mortis sets in or when it finally passes off. With very few exceptions (see page 774), corpses rot. But not all rotting corpses are vampires.

There are, however, curious details that seem to mark some so-called vampire stories as abnormal and worth investigating. One of the 'undead' was said to weep and scream with anguish when the stake was hammered into him. This would have been remarkable indeed had the man been dead beyond doubt when staked, but not quite so unusual if he had been prematurely buried – buried alive but apparently dead, perhaps due to catalepsy. And it does look as if some of these stories have exaggerated the length of time the 'vampire' had been dead and buried, as we shall see.

In 1746 the French monk Dom Calmet, one of the earliest authorities on vampirism, struggled to keep an open mind while searching for the truth. And the truth was not always easy to discern under a welter of superstition and confused eyewitness accounts. But he felt forced to admit:

> We are told that dead men return from their tombs, are heard to speak, walk about, injure both men and animals whose blood they drain, making them sick and finally causing their death. Nor can the men deliver themselves unless they dig the corpses up and drive a sharp stake through these bodies, cut off their heads, tear out their hearts, or else burn the bodies to ashes. It seems impossible not to subscribe to the prevailing belief that these apparitions do actually come forth from their graves.

It is not, however, a statement that would stand up to cross-examination. And it is interesting to note the telling phrases 'we are told' and 'it seems impossible not to subscribe to the prevailing belief'. Dom Calmet's was not an eyewitness account, and his susceptibility to the 'prevailing belief' of the day could have made him a witch-hunter, flat-earther or Nazi with no intellectual struggle at all.

However, the great French philosopher Jean-Jacques Rousseau went much further, stating baldly: 'If ever there was in the world a warranted and proven history, it is that of vampires. Nothing is lacking: official reports, testimonials of persons of standing, of surgeons, of clergymen, of judges; the judicial evidence is all-embracing.'

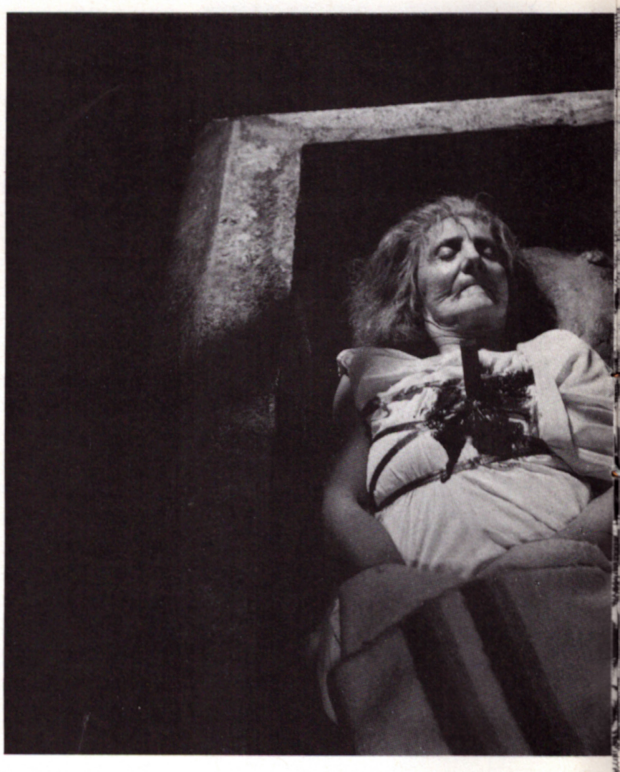
With all due respect to a great man, Rousseau displays greater faith in 'persons of standing' than he does in vampires. And it is not quite true – in his statement at least – that 'nothing is lacking'. Documents apparently abound, but Rousseau could not lay his hands quite so easily on actual vampires.

The prevailing superstition

Montague Summers, a clergyman and writer on the occult – on this matter at least – erred on the side of scepticism, claiming that 'in Romania we find gathered together round the vampire almost all the beliefs and superstitions that prevail throughout the whole of Eastern Europe.'

But even in the late 20th century there are people who believe in vampires as real, supernatural beings. The Reverend Neil Smith, a well-known exorcist of Hampstead in London, believes that vampires exist even in the populous capital. They are, he says, half animal and half human – and totally evil. He dismisses the idea that vampire attacks are 'all in the mind' of the alleged victim by citing what constitutes, to him, incontrovertible evidence of their existence. He claims to have dealt personally with several cases of vampirism. One victim showed him 'the marks on her wrists which appeared at night where blood was taken, marks almost like those done by an animal scratching.' He denied vehemently that these marks could have been self-inflicted. He gave a further example of a man from South America who 'had a similar phenomenon, as if an animal had sucked away his blood and attacked him.'

And, of course, not only vampires attack human beings. Judging from the increasing evidence, so do poltergeists, humanoids and other allied phenomena. Perhaps vampires



Left: detail of a Toltec carving showing a priest holding a human head; the serpents symbolise blood

Above: Dom Calmet, 18th-century vampire expert

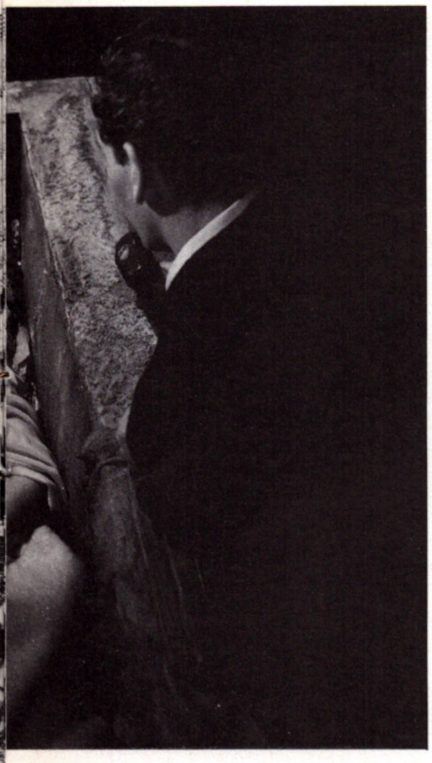
Below: the grave of a gypsy suicide – at a crossroads in Suffolk, England

are 'real' in the sense that they are from another time and place, another dimension; part flesh, part materialisation. We know so little about the paranormal that literally anything might be possible. Yet a few salient facts about the vampire's *bloodlust* may make matters clearer.

From time immemorial the ritual drinking of blood has been the vital element in sacrifice, gaining power and propitiating the gods. For life, one must have blood, and the primitive mind equated more blood with more vitality. Aztecs poured human blood into the mouths of their idols to appease them, while Indian rajahs drank blood from severed heads in order to gain greater strength. The ancient Chinese ate the brains of the revered dead in order to gain wisdom, at the same time guarding the corpse before burial to prevent a dog or cat jumping over it, which would, they believed, turn the dead person into a vampire.

The Romans, brutalised though most of them were, were horrified by tales of what Christians did as part of their worship – they ate flesh and drank blood. Indeed it seems likely that a tiny minority of the early Christians, misunderstanding the symbolic nature of the communion bread and wine, may have resorted to cannibalism. But blood drinking, disgusting though it may seem to us, is very different from supernatural vampirism, and this all seems light years away from the 'enlightened' modern world. Yet as recently as 1973, in as unlikely a setting as anyone could imagine, the fundamental fear of the vampire actually killed a man.

It happened in Stoke-on-Trent in the heart of Britain's Potteries, a town once bustling with the thriving businesses and



Top: a scene from the Hammer Films' production of *Dracula* (1958), which starred Christopher Lee as the aristocratic vampire. Here a once-beautiful young woman, infected with vampirism, is staked in time-honoured fashion. Already she is visibly ageing and will soon crumble into dust, at last truly dead and able to rest in peace

Above: Montague Summers, a Roman Catholic priest who was famous for his expert knowledge of werewolves, black magic and vampires. He died aged 68 in 1948, a believer in supernatural evil as embodied in the vampire

Right: Demetrious Myicura's death in 1973; it appears he died warding off 'vampires'

scandals of the nouveaux riches, but now distinguished only by a faded grandeur and sense of waste. Consequently the row of gloomy, Gothic-style houses known as 'The Villas' does not seem out of place in this defeated landscape. But what happened at No 3 does not seem to have been a very natural occurrence at all.

Demetrious Myicura died there in bizarre and grisly circumstances. Nothing much was known about the dead man except that he was a Polish immigrant who had come to work in the Potteries 25 years earlier.

When he did not turn up for work and no one saw him for a few days the neighbours called the police. John Pye, a young and keen policeman, investigated. It seemed that Myicura had been frightened of electricity, for all the light bulbs had been removed from his room. Using his flashlight, John Pye examined the room. There were newspapers scattered all over the floor and a used frying pan under the bed, on which the dead man lay half covered by a pile of old clothes and tattered blankets. Fully dressed, with one hand behind his head and the other lying across his waist, he might have been sleeping, except for the fact that his mouth was wide open as if in stark terror.

Suspicious circumstances

The pathologist's report said the man had choked to death on a pickled onion. Besides, single, slightly eccentric people are commonly found dead by neighbours and police in scenes of squalor. The incident might have passed into obscurity had not John Pye been puzzling over one or two details of that chaotic room – details not worth mentioning at the time because they seemed to have no bearing on the unfortunate man's death.

For a start the room had been scattered liberally with salt. A bag of it had been placed between Myicura's legs and there was another resting behind his head. There was also salt mixed with urine in various containers placed around the room, and an upturned bowl on the window ledge concealed a mixture of excreta – and garlic.

These curious and unpleasant details seemed to remind PC Pye of something he had heard or read somewhere, and then he remembered what it might all mean. He went to the library and consulted Anthony Master's *The natural history of the vampire* (1972). His suspicions were confirmed; the salt, the urine, the garlic were all features of an age-old ritual to protect oneself against vampires.

The coroner was persuaded to re-examine the 'pickled onion' – it was, as John Pye had gathered, a clove of garlic. What agony and terror Myicura must have suffered in that room on his own, so afraid of vampires that he actually tried to sleep with a clove of garlic in his mouth, and it was on this 'protective device' that he choked to death.

Obsessions, especially among the lonely, take many forms, and this man was obviously obsessed with vampires. He came from Eastern Europe where fear of the 'undead' is still quite common; he lived on his own; perhaps he was simply unhinged.

But although no one will ever know whether the loathsome creatures were hallucinations, projections from his mind, or a sick fancy, his *fear* of them was real. So it could be said that the vampires did get him in the end.

What part did Count Dracula play in creating the cult of the vampire? See page 1034

Testing the healer's gift

Is healing simply a matter of faith, or does the healer really possess a power that can cure diseased tissue? DAVID HARVEY looks at the startling results of some major experiments into this paranormal ability

IF THE LAYING ON of hands and related 'healing' techniques help people to recover from illness, as so many claim, then the process involved should be of major significance. True, the medical profession would have to rethink its attitude towards healing completely, but if we could discover something about the nature of 'faith healing', then the potential benefits would far outweigh the hostility it is likely to incur from the medical establishment. Even if research into the subject revealed only that the healing process were achieved in some relatively mundane way then it would still be of enormous use; for example, in helping established therapists to improve their techniques and encouraging others to learn how to heal.

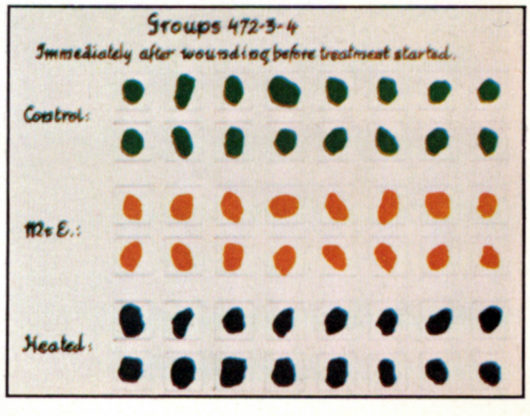
Unfortunately those involved in the mainstream of science – and medicine in particular – still regard even the most attested healers with suspicion and open hostility. So, as with most parapsychological research, it is only the rare, brave individual bold enough to step outside the confines of orthodox science who dare investigate the subject.

One of the pioneers in this field was a young biochemist, Dr Bernard Grad of McGill University, Montreal, Canada, who, in the late 1950s, decided that the claims made for the efficacy of the laying on of hands were too important to be ignored. He believed that it was a phenomenon that demanded to be investigated.

Above: the late Harry Edwards, Britain's foremost spiritual healer of the day, treats a crippled child, watched by a crowd of 6000 people at London's Royal Albert Hall in September 1954. It could be said that by removing the outward symbol of the child's illness – the ugly and constraining leg irons – he is in some way 'shocking' the child into health, in the same way as Christ's 'take up thy bed and walk' healed a paralytic. But are healers more than just clever psychotherapists: do they emit some as yet unnamed force that acts on the body as well as the mind?

To Grad, the fact that no one had run experiments on it before was almost as great a mystery as the healing process itself. As he observed, there was no difficulty in applying suitable biomedical procedures to the process of healing. The explanation for the widespread apathy had to lie elsewhere. Perhaps the very simplicity and apparently unsophisticated nature of the healing process represented an affront to a scientific age dedicated to ingenious, technical solutions to medical problems.

However, Grad was not deterred from delving deeper into the subject. Nor was he alarmed, as many suggested he might be, by the problem of sorting out the genuine from



the bogus healers. He argued that if the alleged healer can really heal, this should be obvious from the results obtained under carefully controlled conditions.

Aware of the exciting possibilities ahead, he stated: 'From such studies, it might be possible to develop tests which would distinguish persons with the gift from those without it; and more importantly, it might provide information basic to some aspects of the healing art, namely psychotherapy and the so-called placebo effect.'

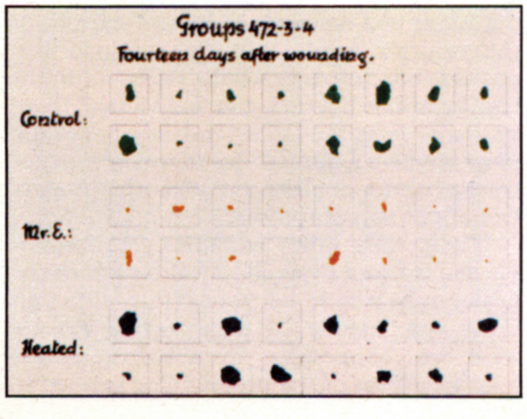
Indeed, the discovery of the placebo effect in drug trials had already raised some extremely difficult questions for medical scientists: human beings were not the predictable biochemical machines they had assumed.

Great expectations

When tests are conducted to evaluate the effect of new drugs, a control group is always included. The surprise result on a number of occasions has been that some members of the control group, dosed with plain sugar pills (placebos), have mimicked the physiological response of those who took the actual drugs, a phenomenon known as the placebo effect. Expectation, instilled by taking part in the trials, seems to have been the crucial factor since none of the 'guinea pigs' (and none of the staff who handed out the drugs) knew whether they were receiving sugar pills or the real thing. This type of experiment is known as 'double blind'. So under controlled conditions it has been shown that the mind, primed by suggestion, can influence the body's behaviour to a remarkable degree.

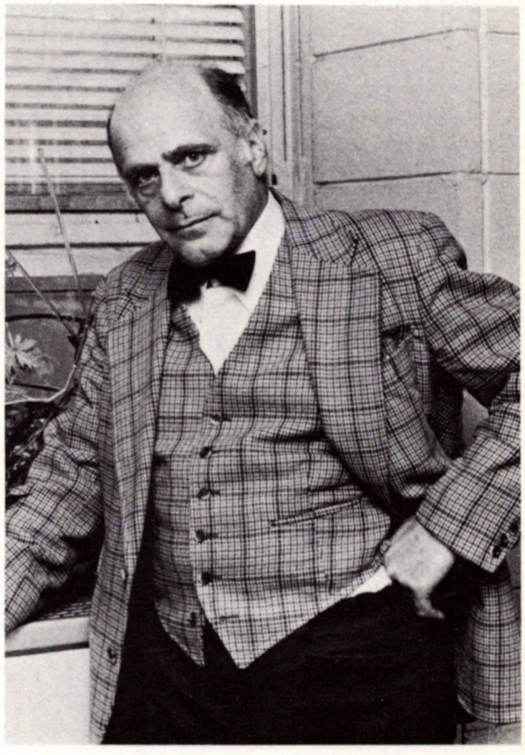
In the early years of the 20th century, the notion that such an interaction could occur was regarded as mere speculation, although many had maintained that the mind-over-body effect was real enough. But interesting though placebo-effect experiments are, Grad considered they did not go far enough. Would his research show that healing depends for its effectiveness on the mysterious power of suggestion? Or would it reveal yet a further layer of complexity in this subtle and imperfectly understood process?

Impressed with the anecdotal evidence for the effectiveness of the laying on of hands, Grad decided to see whether he could devise experiments that would show that this form



Below, far left: day one of an experiment to test Oskar Estebany's healing through the 'laying on of hands'. Forty-eight mice were 'wounded' by having a piece of skin removed. Here the wounds can be seen to be fairly uniform in size and degree. Some of the mice were then handled by Estebany twice a day for 20 days. The rest were either left untreated – but put in containers heated to simulate the warmth of human hands – or they were handled by other members of the staff in a manner similar to that of Estebany

Left: day 14 and the wounds of the mice treated by Estebany have healed significantly faster than any of the others



Right: Dr Bernard Grad, whose pioneering experiments into the nature of spiritual healing have also provided insights into other aspects of Man's potential. For example, having 'green fingers' may not be a matter of luck, but part of a barely understood gift of regeneration

of treatment involved another force or some, as yet undetected, interaction between the healer and patient. The problem was to find a way of successfully isolating one factor from the others. Just as the placebo effect had upset the results of drug trials, so suggestion might interfere with an attempt to find out what is happening when a healer is at work.

Grad quickly concluded that the use of human beings in any experiment would make the task next to impossible: there would always be doubt as to which factors – suggestion or 'faith' – were responsible for any change or improvement. So he chose to use animals and plants for his project. As far as anyone is aware, neither are susceptible to the power of suggestion nor do they have expectations about the purpose of any experiment. From this point of view, Grad felt he would be on safe ground.

The healer he chose to act as the agent for the research was Colonel Oskar Estebany. A retired Hungarian army colonel, he had discovered his healing ability when working with cavalry horses, and then developed his talents with human patients. In later years, healing became his main activity. He asked nothing for his services and made no extravagant claims about what he could achieve. In 1957 he left Hungary and went to live in Canada, and by 1960 he had a paid job in Grad's laboratory.

In the first experiment, 48 mice had a small piece of skin of similar size removed from their backs under anaesthesia. They were then weighed and the dimensions of the wounds measured and recorded. (For two weeks prior to the experiment the mice had been 'gentled' by handling since it had been found that nervous animals made unreliable

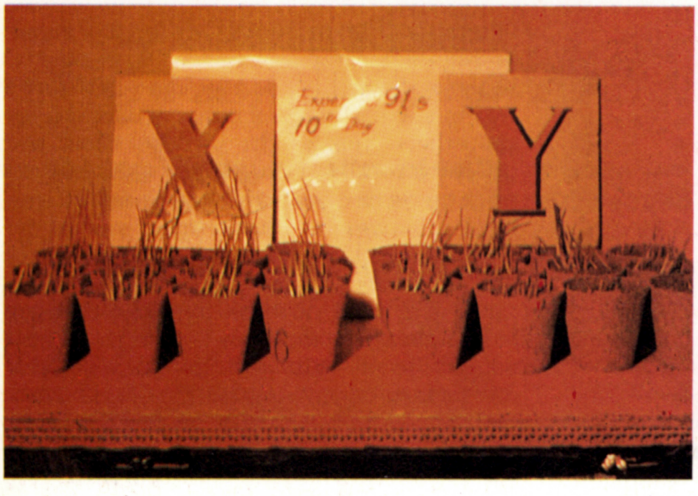
subjects for research work.) At this stage in the proceedings no one knew which mice were to serve as controls and which were to receive treatment.

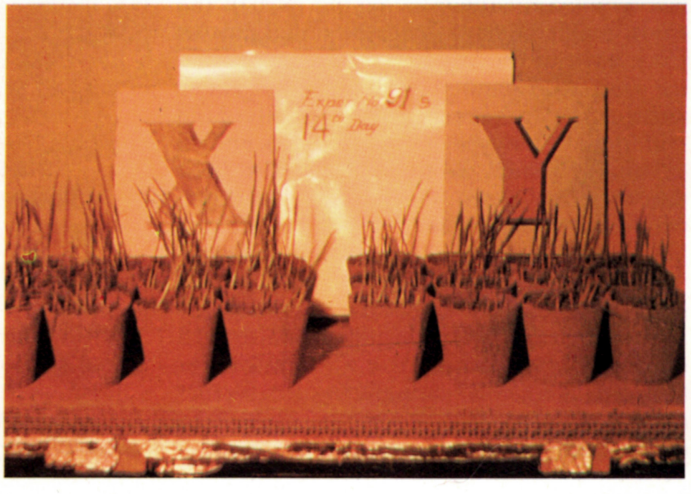
After the operation, the mice were divided into three groups, which were placed in separate wire cages. Estebany treated the first group by standing the cage on his left hand and resting his right hand on the top. There was no physical contact with the mice.

The second group was cared for in an identical way in terms of feeding and other routines, but left alone – this was the control group. The third group also received identical care but, instead of being treated by Estebany, the mice were warmed to a temperature comparable to that generated by the healer's hands, to see whether heat alone would accelerate wound healing.

The skin wounds were measured regularly over a period of 20 days so that their recovery rate could be analysed and compared. The mice that had been warmed showed no significant difference in their speed of healing from the control group. The mice treated by Estebany recovered at a much faster rate than chance expectancy.

Could Oskar Estebany's healing power make plants grow faster? Dr Grad set up a simple experiment to test this possibility: barley seeds were planted in two groups of pots, labelled X and Y. Both groups were watered with a weak saline solution, but group X was watered with a solution that Estebany had held, in a flask, for 30 minutes. Group Y was watered normally by a member of staff. By day 10 (below left) group X was already significantly taller and stronger than the control group, and by day 14 (below right) the difference was even more marked





The scars of the mice treated by the healer had shrunk almost uniformly to pencil-point size. Those of the mice in the other groups showed varying stages of healing; some scars were as small as those in Estebany's group but about half were markedly larger.

But however promising the results from this one experiment might look, they cannot be regarded as a breakthrough. As in any scientific experiment, replication of results by other laboratories is an important check on the soundness of the procedures and therefore on the validity of the results.

A similar experiment to Grad's was staged at the University of Manitoba, also in Canada. This time it involved a total of 300 mice. Double-blind conditions were incorporated into the project to avoid any possibility of unconscious manipulation by the experimenters. As a further check, one group of mice was 'treated' – copying Estebany's procedure – by people who made no claim to a special healing ability. Once more, those treated by Estebany showed the most rapid rate of recovery.

From these results, Grad felt that he was on the verge of a significant discovery – but where was it leading? To clarify this, his next goal was to learn more about the underlying mechanism involved. If there were some healing force at work, as the animal experiments seemed to prove, there was no reason to suppose that it should be effective only on the animal kingdom. To discover whether any measurable effects could be registered using plants as the healing target, Grad devised an experiment to see if Estebany could influence the germination and rate of growth of barley seeds. And, if successful, the experiment would presumably throw further light on the mechanism involved.

To begin with, Grad watered the seeds with a weak saline solution. The pots, already numbered, containing the seeds were dried out, stood in rows and watered.

The only variable factor in the treatment of the seeds was that some pots were watered with a saline solution that had been held by Estebany. That was the only part he played in the experiment. There was no direct contact between the healer and the seeds or pots. More of those that had been watered with the 'treated' saline solution germinated faster, grew quicker and healthier than the control group.

Grad wondered if the results could be attributable to bacterial growth present in the water and encouraged by the warmth of the healer's hands, but this seemed impossible because only sterile, saline solutions had been used. Grad concluded that there probably was an independent, beneficial force involved, something that could penetrate a barrier of glass and affect the properties of the solution inside.

There were other variables to consider. He had isolated a specific effect for which the healer appeared to be responsible, although Grad was unable to demonstrate exactly what was happening. Even so, there was another aspect of the process that seemed to

be worth exploring: the psychological condition of the healer under which this 'force' or 'energy' could be best transmitted.

Taking note that Estebany and other healers maintained that a calm, tranquil frame of mind was a prerequisite for healing to take place, Grad selected three people with obviously different psychological states to treat the saline solution before running the barley seed test. He hypothesised that if the healer had a positive effect on the solution, and thence the seeds, there should be a different result according to the state of mind of the individual.

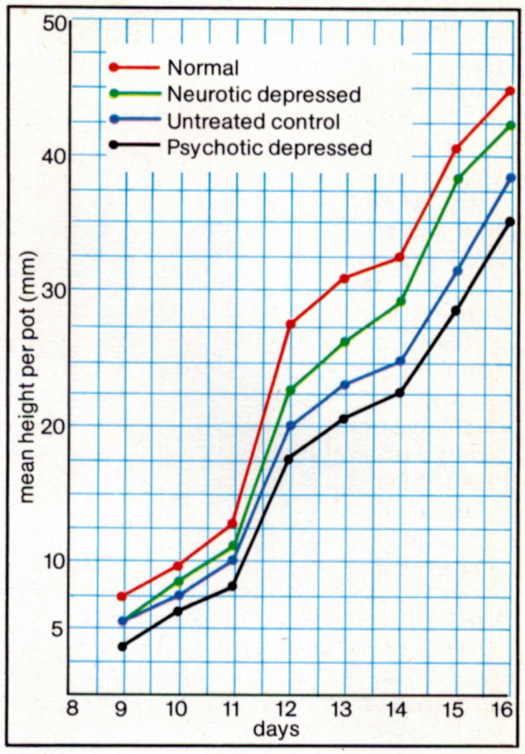
Of the three people he chose, J. B. was psychiatrically normal, with a reputation for being a 'green-fingered' gardener. The other two, R. H. and H. R., were both disturbed and under psychiatric care. What Grad was looking for was evidence of a differential germination and growth rate: a higher yield from the positive and confident individual compared with the other two participants in the experiment. Each held a sealed flask of sterile saline solution for half an hour and then the experiment proceeded as before; the control set of flasks was not touched by any one. The man with green fingers achieved a significantly higher germination and growth rate than the others.

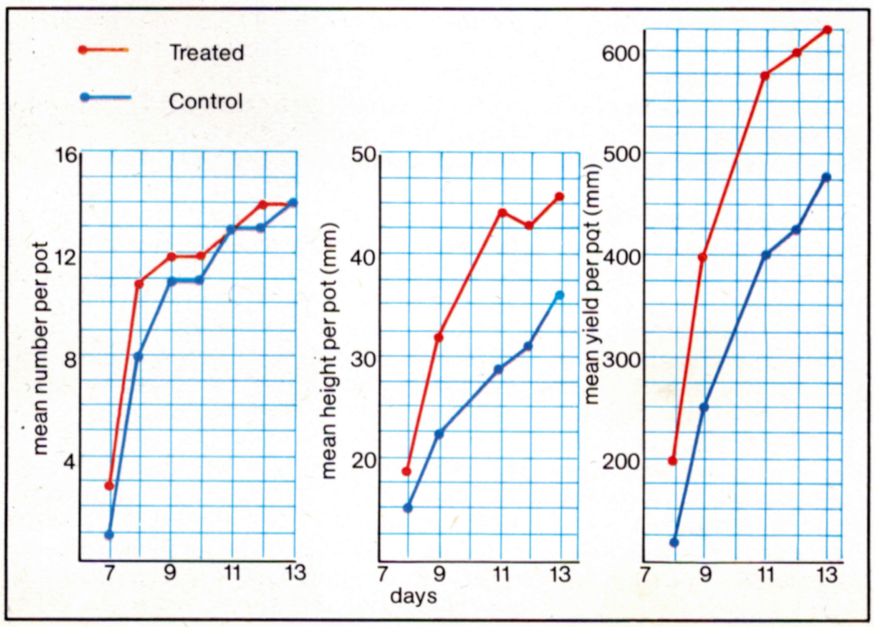
A disturbing effect

Pondering on the results of the seed experiment, Grad returned to his earlier supposition that people who were disturbed would have a negative effect on the seeds. He believed that there were still further lessons to be teased from the exercise. Was there any explanation why R. H.'s seeds grew relatively more vigorously than those in the untreated control group, and those of H. R. less so?

On questioning them on their attitude and state of mind at the time when they were treating the water, Grad learned that R. H., a woman, had suddenly perked up and shown an active interest when informed of the purpose of the experiment, and had cradled the flask in her lap. In contrast, H. R.'s mood remained agitated and depressed. This, for Grad, proved the point that it was not the individual's usual, everyday disposition, but that which prevails at the *time* of the experiment that seemed to be the factor.

The significant difference in the growth rate of seedlings treated by Oskar Estebany and those treated similarly by ordinary laboratory staff over a number of days can be seen in the chart (below). But can mentally disturbed people have a dramatically different effect on growing plants? Dr Grad set up a test involving one clinically neurotic patient, one psychotic patient and, as a control, a normal person. Each had to hold, water and care for the same number of pots containing seedlings. The results of these tests (right) seem conclusive. In some way (as yet unknown) the positive mood of a normal person can encourage the growth of organic matter and, more significantly, certain people – 'healers' – can somehow accelerate its healthy growth





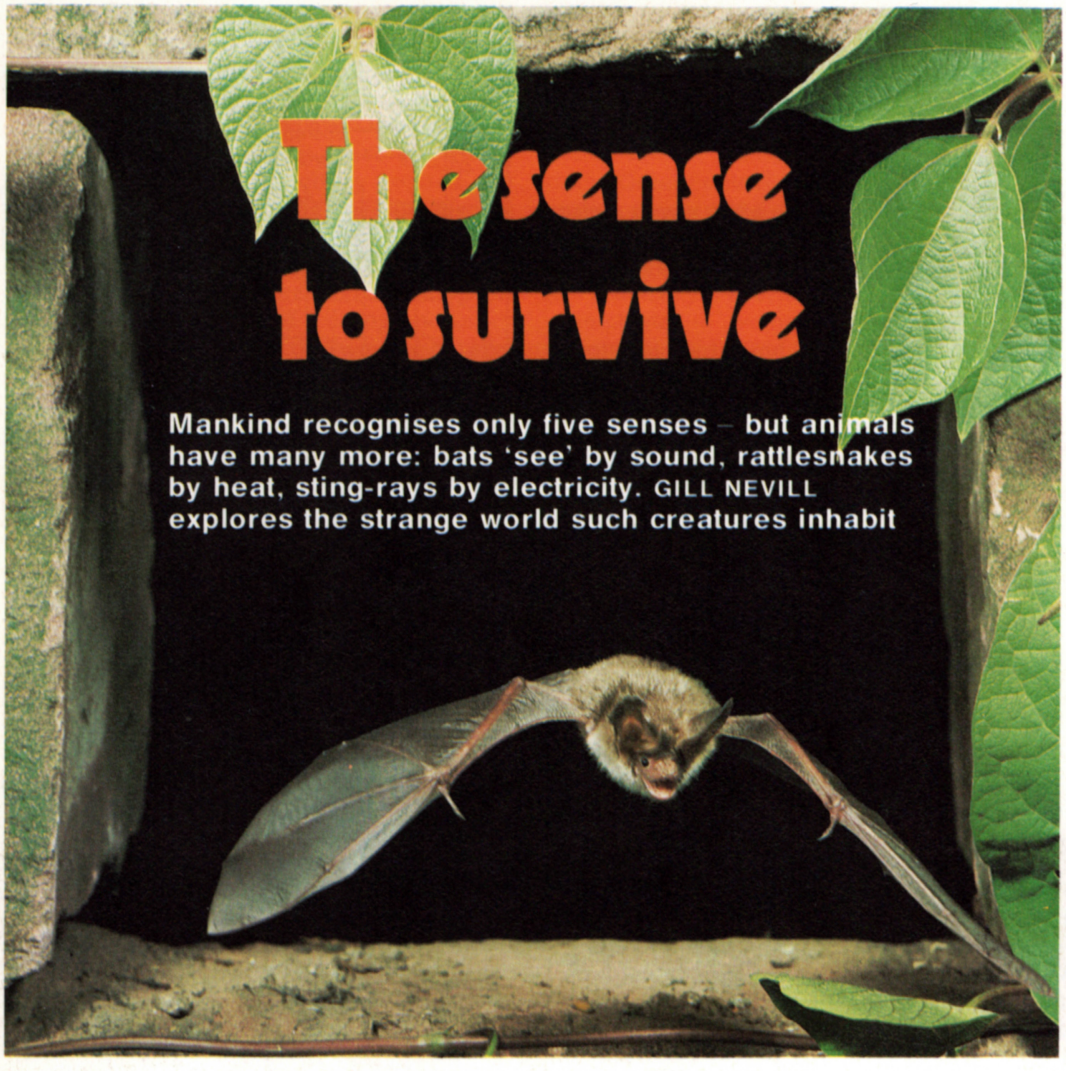
While Grad had not finally resolved the question of what was responsible for changes that resulted from the laying on of hands, he believed he could advance some conclusions: first, from the mice and barley experiments, he felt that there was evidence that the laying on of hands could induce cell growth and that the way in which this occurred suggested the action of some kind of energy that was not merely heat. Second, he concluded from the differing results achieved by the psychiatrically normal and the disturbed subjects that there was a damming or releasing control associated with the individual's state of mind at the time of the experiment.

Grad speculated further. He wondered whether these experiments underlined the importance of rapport between therapist and patient which, when strong and positive, involved the transfer or generation of some energy that aided the healing process.

Like so much pioneering research, Grad's work raised many questions, all of central importance to medicine and Man. His experiments also inspired other scientists to pick up the trail themselves. Several have reported findings that corroborate those claims made by Grad for some independent healing energy, and the search goes on. Whether or not that energy will be tracked down, we shall have to wait and see.

The sense to survive

Mankind recognises only five senses – but animals have many more: bats 'see' by sound, rattlesnakes by heat, sting-rays by electricity. GILL NEVILL explores the strange world such creatures inhabit



Left: a pipistrelle bat. Bats hunt by night and have developed a remarkable method of finding their way and locating prey in the dark: instead of using their eyes, they emit high-pitched shrieks that bounce back off nearby objects and enable them to build up a sound-picture of their immediate surroundings

SUPPOSE YOU WERE ASKED to describe somebody to a third person who did not know him. The likelihood is that you would describe in detail what he looked like: brown hair, blue eyes, pink cheeks, a determined walk and so on. You might also speak of his voice and the sort of thing he might say, but you probably would not mention his smell.

Neither would you talk about the pattern of heat waves he exuded, nor the way that sound bounced off him. Nor would you say anything, except in the most metaphorical sense, about his electricity or his magnetism. We simply don't take account of these things. But for a mouse, a bat, a rattlesnake or a sting-ray, such details might contain the information they need to recognise that person.

All this underlines how limited our human senses are: we see, we hear, and we sometimes use our sense of smell. And that is about all. What is more, we subconsciously assume that animals perceive the world in a similar way. But in fact, research shows that the senses of animals are much more varied than our own. In effect, they live in worlds quite different from ours, and as a result much of their behaviour is a mystery to us.

We are astonished that sea salmon can find their way unerringly back to the streams in which they hatched, that pigeons can home on cloudy days, that bats can fly in the dark, and even that police dogs can follow a criminal across country.

It is, of course, very difficult for us to understand senses we do not have. And, not surprisingly, some of our most important discoveries about the mysterious senses animals possess have happened by chance. In 1956, for instance, an American professor of physics, Kenneth Roeder, was giving a party on his terrace. As the evening wore on, moths began to congregate round the Chinese lanterns with which the terrace was lit. There they fluttered until one of the guests absent-mindedly ran a damp cork over his glass. It made a shrill squeak, and immediately all the moths fell to the ground.

At first, everyone assumed that the noise was the moth equivalent of sonic boom, and that the moths had died of shock. But the moths soon began to move, and before long were flying around as though nothing had happened. But when glass and cork were rubbed together a second time, the moths again dived for cover. Professor Roeder was intrigued. Why should moths react so dramatically to that shrill squeak?

His question led him back to a discovery

made nearly 20 years earlier. In 1940 the American scientist Donald Griffin first demonstrated what is now well-known: that bats emit powerful ultrasonic cries as they fly and, by listening to the echoes of these sounds, are able to 'see' in the dark. Commonplace as this knowledge now seems, it was initially met with incredulity: when Donald Griffin first described the phenomenon, which he called 'echo-location', sonar and radar were well-guarded military secrets, and the whole concept seemed so revolutionary as to be almost incredible.

The echo-location system is so sensitive that bats fly quite easily in the dark in a space criss-crossed by wires less than a hundredth of an inch (0.2 millimetres) in diameter. And they have no trouble in detecting something the size of a moth. Squeaking furiously so as to update the information as fast as possible, they close in on their prey. And the end of a successful chase is marked by the bat either catching the moth directly in its mouth, or scooping it out of the air using its wings as a sort of butterfly net.

Many moths, however, have learned to treat the bat's hunting squeaks as a warning siren and to take effective evasive action. They have special sound-sensitive cells tuned to the bat's frequency, and as soon as they hear a bat they either dive for the ground or fall through the air in a tumbling spiral that bats find very difficult to follow. So here was the explanation for the behaviour of the moths at Professor Roeder's party: they had mistaken the sound made by cork on glass for an approaching bat.

Mysterious as the capacity for producing and detecting ultra-sound may seem to us, it is quite widespread among animals – particularly among rodents. Baby mice falling out of the nest utter what to us are inaudible shrieks. But other mice hear the SOS loud and clear. Not just the mother, but any other adult mouse in the vicinity, will rush to rescue the baby and carry it back to the nest in much the same way as a retriever carries a puppy.

This capacity to use ultra-sound has evolved more than once. The oilbird, *Steatornis caripensis*, which lives in caves in the West Indies, has it. So do many species of dolphin and whale. The only thing that these creatures have in common is that they live mostly in the dark, and darkness seems to be a wonderful spur to sensory ingenuity.

It is not just ultra-sound to which animals turn in the absence of light. Sting-rays, for instance, have on their snouts the most sensitive detectors of electricity in the animal kingdom. They detect creatures hidden in the sand merely by the distortion their bodies produce in the electric field.

Rattlesnakes, on the other hand, have pits near their nostrils containing rank upon rank of cells rather similar to our own heat detectors. But where Man has only 19 to the square inch (three to the square centimetre), the rattlesnake has 150,000. Massed like this, the detectors give the snake a complete heat picture of its environment. So even in darkness it is entirely able to pick out the best camouflaged mouse or rat from its colder background.

It is well-established that birds migrating by night can use the stars and the Moon to help them find their way, just as those migrating by day use the Sun. But far more debatable is what happens when the sky is covered by cloud. Some birds certainly fly in such conditions, and the suggestion has been made that they orientate by magnetism. In the 1970s only the lunatic fringe held this view; today the situation is rather different.

The suggestion began with the knowledge that the Earth itself is a magnet: not a very strong one, nor a very stable one, but a magnet, nevertheless. What is more, the two magnetic poles at either end of the globe are linked by a magnetic field whose strength varies systematically between them. So in theory at least, animals could use it to find their way.

But do they do so in practice? We humans, after all, need a compass to make use of the Earth's magnetic field. But that is not an option open to animals. At first it seemed inconceivable that animals should be biologically sensitive to the Earth's very weak magnetic field. But slowly the evidence began to accumulate.

If robins are put in a cage just before they

The Italian wall lizard, *Podarcis sicula*, has a 'third eye' – a spot on the top of its head that is extremely sensitive to heat (above: the 'third eye' is the small green spot). Using this, it can build up detailed heat pictures of its surroundings even in complete darkness – rather like those provided by a thermograph (left), in which the hottest areas are white, the coldest blue-black

Above right: the oilbird, *Steatornis caripensis*, lives in dark caves in the West Indies – and, like the bat, it has developed the capacity to use ultra-sound for echo-location

The third eye

The pineal gland is an organ about the size of a pea situated near the lower part of the brain. Although it is considered by modern doctors to be vital to the healthy functioning of the body, it is still not fully understood.

For thousands of years, Hindus and Buddhists have believed that the pineal gland is, in fact, a 'third eye'. Many statues and paintings, such as this one (right) of the Hindu goddess Kali, show the third eye firmly planted between the normal two eyes. The Tibetan Buddhists believed that the third eye, when opened, enables one to see a person's aura, the reflection of the life force burning within.

In his book *The third eye*, Tuesday Lobsang Rampa writes of an operation he believes he had in a previous incarnation to 'open up the eye'. He describes how Tibetan monks drilled through his forehead; a sliver of wood was then inserted and pushed until Rampa felt a blinding flash. It then remained in his forehead for three weeks, during which time, Rampa says, he was kept in a darkened room with only the minimum food and drink. When the wood was removed, Rampa could see coloured auras around people; in time, he learned to tell whether someone was ill by the colour of his aura. He could also tell whether someone was lying.

When it was discovered that Rampa was actually an Englishman, the authenticity of his claims was challenged. But the real Rampa – one Henry Hoskin – could only repeat that he was a reincarnation of the Tibetan lama Tuesday Lobsang Rampa, and many people are convinced of the truth of his story.

would normally migrate, they perch in a direction facing their intended destination. Normally, of course, they take their directional cues from the sky, but scientists have found that, even in a completely featureless environment, the robins were able to maintain a correct bearing. If, however, the magnetic field around them was distorted, they immediately became disorientated.

But the matter was clinched, at least as far as birds are concerned, by a discovery in 1976 about the anatomy of the common or garden pigeon. A whole sport has grown up around the fact that pigeons can not only find their way home but can do so very fast. Six hundred miles (1000 kilometres) in a single day is a good average, and experienced birds not only home on cloudy days, but even when temporarily blinded by frosted glass contact lenses. So the question is, do these pigeons use magnetic clues – and if so, how?

The answer seems to lie in a small piece of tissue between the homing pigeon's eyes. Analysis shows that it contains exactly the same mineral as mariners once used for a crude compass: a permanently magnetised mineral of iron – lodestone or, more technically, magnetite. More than a million tiny bar-shaped lumps of this material are clustered together in a tiny patch of tissue – more than enough, the scientists say, to enable the bird to detect the variation in the Earth's magnetic field.

That the magnetite is actually used by pigeons as a compass is more difficult to prove. No nervous pathways have yet been traced, and we do not know how these detectors – if that is what they are – work. One thing, however, is certain. With powerful bar magnets strapped on their backs, pigeons fail to find their way home, whereas with non-magnetic brass bars they return just as well as with no interferences. But the precise nature of the connection with magnetite remains a mystery.

Zoologist Dr Robin Baker tests the theory that human beings use the magnetic field of the Earth in navigation. He blindfolds subjects and takes them to a secret location (left). There, he asks them to point in the direction of their home (below left). Then he repeats the experiment, strapping either a brass bar or a magnet to the subjects' heads. Only those with the brass bars point correctly

Bees, too, contain magnetite, but its primary purpose does not seem to be to help them orientate. Rather, it is thought, that in the darkness of the hive bees lack visual cues to set their biological clocks, and so they tune in to the daily variation in the magnetic field and use it to keep their own clocks running accurately. A great variety of animals are able to tell the time, so could it be that magnetism is a much more widespread sense than, until 1976, everyone assumed?

Even human beings may not be as insensitive to magnetic fields as we imagine. As part of his studies Dr Robin Baker, a zoologist of Manchester University, has been taking people blindfolded from their homes and driving them along a twisting route to a secret destination. There he asks them to point in the direction of home – which they do with surprising accuracy. He then straps either a magnet or a brass bar onto the heads of his victims and repeats the experiment with a different destination. Only those with the brass bars are able to point correctly.

Magnetism is likely to play a more dominant role in the lives of birds, which have a very poor sense of smell, than in mammals, in

which the sense of smell is well-developed. Even though this is a sense we share with other mammals, it is surprisingly hard for us to understand. Not only is there no easy way to measure and identify smell, but there is the further problem that we tend to disregard what information *does* come from our noses. It has been estimated that over 90 per cent of our sensory information comes from our eyes – and our other senses suffer accordingly.

In fact, our sense of smell is quite acute. A skilled sniffer like a perfumier can identify up to 10,000 different odours, and on one occasion a Water Board official on BBC television's discussion programme *Panorama*, sipping water from seven glasses drawn from different points on the River Thames, identified unerringly the places from which they had come.

And even if we don't automatically include smell in our descriptions of people, we immediately recognise the smell of those close to us, while other scents can recall vivid memories. The much-quoted episode in Marcel Proust's novel *A la recherche du temps perdu* when the savour of a tea-soaked madeleine cake evokes the memory of a whole episode from his childhood is one example.

The fact remains, however, that our use of our sense of smell pales into insignificance beside that of animals. Dogs, for instance, have 50 times the area that we have given over to olfaction, the sense of smell, and so they are able to detect substances in a concentration a thousand or even a million times less than our own.

Because smell is so difficult to measure, we must often infer the part it plays in the lives of animals by watching their behaviour. Badgers leave smelly faecal messages in open pits round the edge of their territories, which serve as 'no trespassing' notices. Hippos scatter their dung with their short flat tails so that it hangs conveniently at nose height, so that passing animals cannot but smell it. Dogs anoint lamp posts. Otters leave their dung, or spraints, at well-marked vantage points . . . and so it goes on.

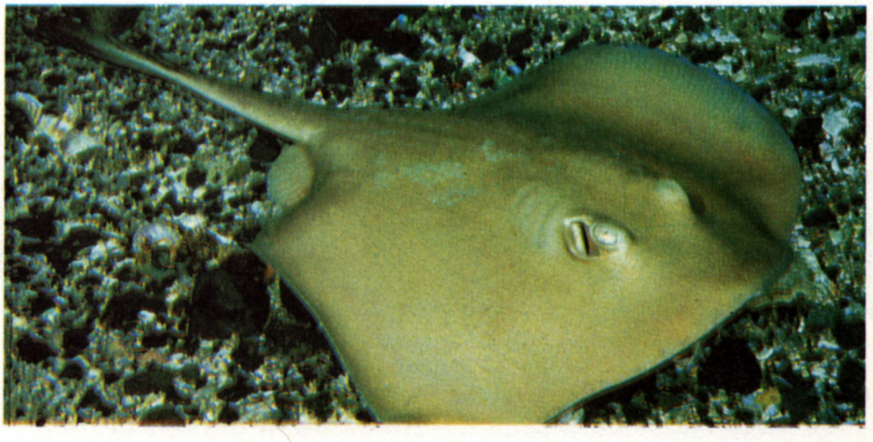
Animals of the same species are often quite extraordinarily sensitive to these chemical messages. Salmon coming back from the sea home on the special scent of the particular race living in their birthplace. This smell they somehow pick up even in the estuary and they follow it unerringly up to their spawning ground. If, however, their nostrils are plugged, they lose their way.

But these chemicals are also capable of carrying more intimate messages. Female sexual attractants are common among insects – the female silk moth, for instance, summons her mate by special chemical from a couple of miles down wind.

At the other end of the scale, the rhesus monkey produces a substance called copulin, which attracts the male. Since chimpanzee females and gorilla females possess similar chemicals, the question arises: do we? Certainly we are sensitive to chemical influences of which we are entirely unaware.

In one American study, for instance, it was shown that women college students sharing the same dormitory tend to menstruate at identical times. In another study men, pregnant women and children have been shown to be very insensitive to a chemical relative of civet and musk. Women, on the other hand, smell it easily – and their sensitivity is most acute at the time of ovulation, when they are at their most fertile. A similar chemical is found in men's urine, so the question arises: are men producing a chemical specifically to appeal to fertile women? The whole subject of chemicals and human sexuality is still relatively unexplored, but the little knowledge we have suggests that animals may not have the monopoly of home-produced aphrodisiacs. It has even been suggested that pubic and underarm hair exists precisely in order to provide a large evaporative area for our body odours and their important messages.

The more scientists piece together information about animal senses, the more they realise how much is still a mystery. Ultra-violet-sensitive pigments have been discovered in the chicken's eye – what are they doing there? Amphibians and reptiles have heat-sensitive 'third eyes' – what for? What will be the next sense to be discovered? And could we learn to use our neglected and undiscovered senses?



Below left: mulberry silk moths, *Bombyx mori*, mating. When they are ready to mate, female silk moths produce a chemical to which males are immensely sensitive – and use it to summon their mates, sometimes from as much as a couple of miles away

Below: the Australian stingaree, a member of the sting-ray family, whose snouts bear the most sensitive detectors of electricity known in the animal kingdom

Further reading

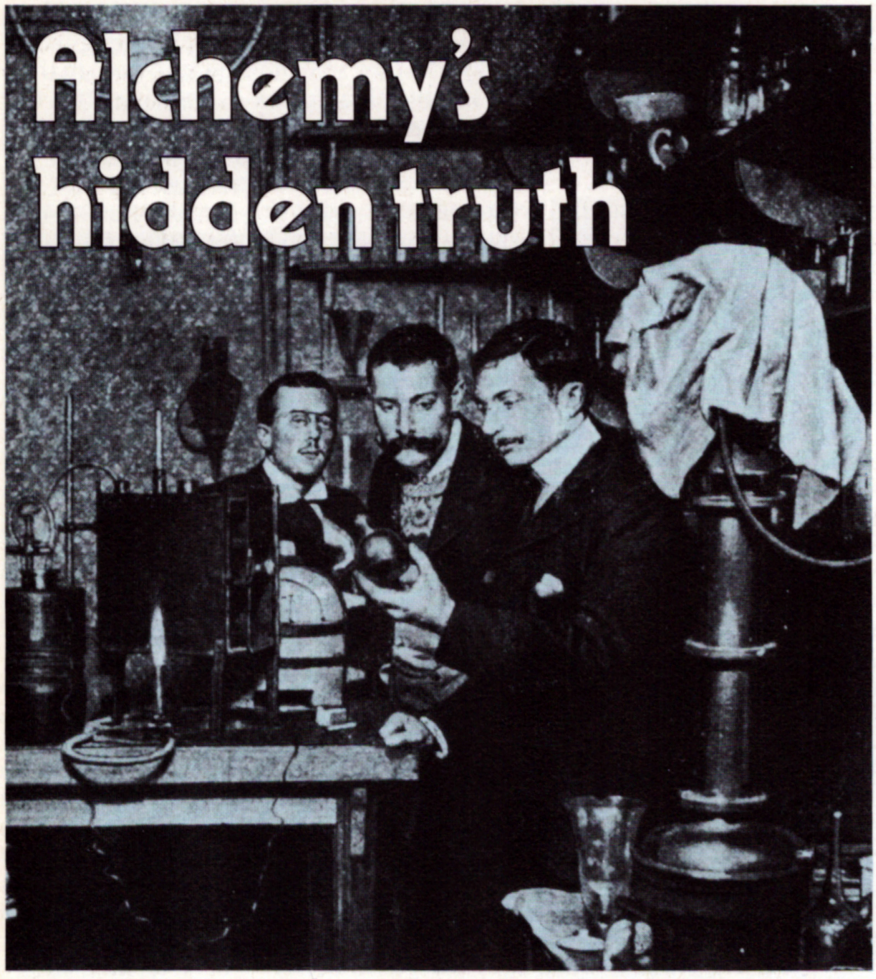
John Cloudsley-Thompson, *Animal migration*, Orbis 1978

Richard Dawkins, *The selfish gene*, Oxford University Press 1976

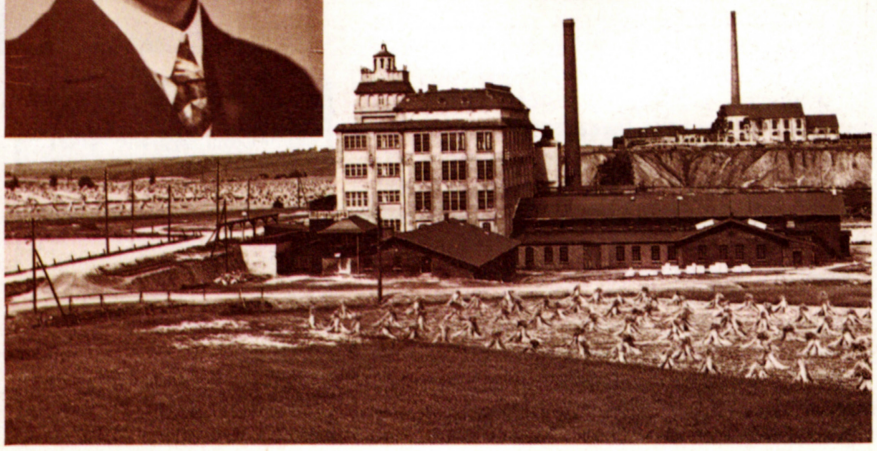
Matthieu Ricard, *The mystery of animal migration*, Constable 1969

E.O. Wilson, *Socio-biology: the new synthesis*, Harvard University Press 1975

Alchemy's hidden truth



In the 20th century science has achieved the alchemical dream of transmuting the elements. But modern alchemists still use traditional methods in pursuit of their quest. BRIAN INNES brings their story up to date



THE GROWTH OF experimental science during the 18th and 19th centuries; the work of chemists such as Lavoisier, Priestley and Davy; the establishment of Dalton's atomic theory; and the subsequent discoveries of a host of scientists in all aspects of chemistry and physics – such developments should have sounded the death knell of alchemy. And yet they did not.

During the 19th and early 20th centuries, it is true, alchemists retreated into the mystical, spiritual aspects of their study. They were drawn into the Rosicrucianist occultism of societies such as the Golden Dawn and the Ordo Templi Orientis (OTO), which contrived to combine ill-digested snippets of oriental philosophy with the western European magical tradition.

Then, in 1919, the British physicist Ernest Rutherford announced that he had successfully achieved the transmutation of one element into another.

He had, in fact, changed nitrogen into oxygen. Admittedly, the amount of oxygen produced, some 20 parts per million, was minute, and the technique used, involving high-energy radiation, did not resemble in the slightest the procedures of the alchemists. But the experiment refuted the insistence of most scientists that transmutation was impossible, and all aspiring alchemists took heart.

It was in fact already known that transmutation took place in nature. The radioactive elements gradually 'decay', giving off radiation and producing further radioactive 'daughter' elements, which in turn decay. After a series of decays the end product, lead, is formed.

What Rutherford had done was to reverse the process. He had bombarded nitrogen gas with radiation consisting of fast-moving nuclei from the gas helium and had produced oxygen and hydrogen. The experiment can be expressed very simply in terms of atomic numbers (the chemical properties of each element are determined by its atomic number, which is the number of protons in its nucleus):

$$N(7) + He(2) = O(8) + H(1)$$

What every alchemist now asked himself was whether a similar kind of sum could be used

Opposite, top: the directors of the *Société Alchimique et Astrologique de France* in their laboratory in 1903. Despite the discoveries of 19th-century chemistry and physics, alchemy refused to die. The magazine that featured this picture said: 'To turn astrology into a true science, in which there is no room for fantasy – this is what they preach in their journal, *Rosa Alchemica*'

Opposite, below: the young Adolf Hitler (far left), with his patron, Erich Ludendorff. In association with Franz Tausend (centre), Ludendorff formed Company 164 to 'manufacture' gold. As a result they were able to divert 400,000 marks into Nazi Party funds. Tausend set up his gold-production laboratory at a quarry near Munich (right)

as a guide to the conversion of lead (82) into gold (79). Or perhaps another element might be a better starting point?

One of those who took renewed inspiration from the results of this experiment was a 36-year-old chemical worker in Munich, Franz Tausend. He had a theory about the structure of the elements that was a peculiar blend of the beliefs of Pythagoras, who had regarded the Universe as a combination of musical harmonies, and the discoveries of modern chemistry.

Tausend had published a pamphlet called *180 elements, their atomic weight, and their incorporation in a system of harmonic periods.* He believed that every atom had a frequency of vibration characteristic of that element, related to the weight of the atom's nucleus and to the grouping of electrons in orbital rings around it. Later research showed that this part, at least, of his theory was basically true. Tausend went on, however, to suggest that matter could be 'orchestrated': by adding the right substance to an element, it should be possible to change its vibration frequency into that of another element.

In 1924 Adolf Hitler was sent to prison for attempting to organise an armed uprising; one of his fellow conspirators, General Erich Ludendorff, was acquitted and in the following year stood for election as President of the German Republic. After being resoundingly defeated by the national hero Hindenburg, he turned his attention to raising funds for the infant Nazi Party. There were rumours in government circles that a certain Tausend had succeeded in making gold by transmutation, and Ludendorff got together a group of industrialists and businessmen to investigate the matter.

On Tausend's instructions one of the group, the merchant Stremmel, purchased the necessary materials – mainly iron oxide and quartz. They were melted together in a crucible, which Stremmel then took to his hotel bedroom for the night so that it could not be tampered with. In the morning, Tausend heated the crucible again in his electric furnace, in the presence of his visitors, and then added a small quantity of white powder to the molten mass. When the crucible had cooled it was broken open, and a gold nugget weighing a quarter of an ounce (7 grams) was found inside.

Financing the Nazis

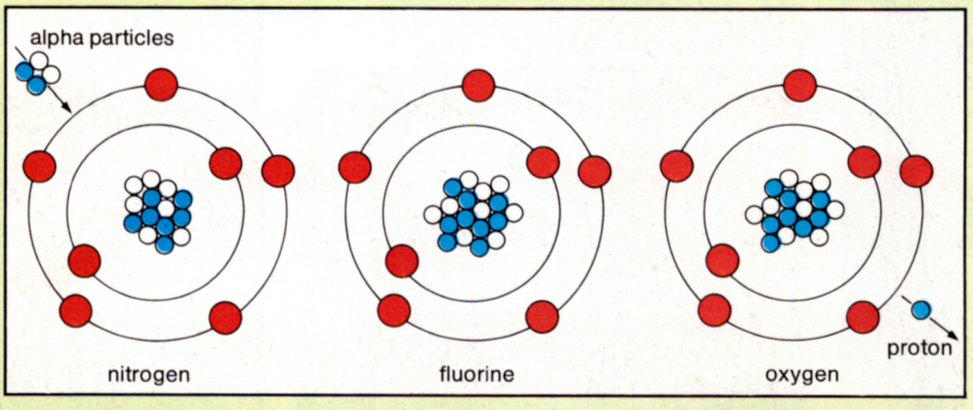
Ludendorff was overjoyed and immediately set about forming a company, which he called 'Company 164' – a number that, intriguingly, is twice the atomic number of lead. Ludendorff was to receive 75 per cent of the profits and Tausend 5 per cent. Investment money poured in and within a year the General had managed to divert some 400,000 marks into Nazi Party funds. Then, in December 1926, he resigned, leaving Tausend to handle all the debts. Nevertheless, Tausend contrived to continue raising money and on 16 June 1928 allegedly made 25 ounces (723 grams) of gold in a single

Atomic alchemy

Rutherford's work strengthened the conviction of orthodox scientists that the methods of the alchemists could never lead to the transmutation of elements. It was found that the atom has a central nucleus consisting of particles called protons, with positive electrical charge, and an equal or greater number of neutrons, lacking charge. Relatively light negatively charged electrons orbit the nucleus and fix the atom's chemical properties. The number of electrons is equal to the number of protons in the nucleus, so that the atom's positive and negative electrical charges balance.

So to change one element into another it is necessary to change the number of protons in the nucleus of each atom. The nucleus must be bombarded with fast-moving particles – either to force in additional protons or to disrupt the atom so that it loses protons. Today physicists use particles artificially accelerated by 'atom-smashing' machines. And they insist that chemical processes affect only the outer electrons, not the atom's deep interior.

Above: a modern particle-accelerating device



Left: Rutherford bombarded nitrogen atoms (seven protons, seven neutrons) with alpha particles (two protons bound to two neutrons), forming fluorine atoms (nine protons, nine neutrons). These lost a proton, forming a type of oxygen (eight protons, nine neutrons)

operation. On the strength of this he was able to issue a series of share certificates, each to the value of 22 pounds (10 kilograms) of gold.

But when, a year or so later, no more gold had been produced, Tausend was arrested for fraud; and on 5 February 1931, after a sensational trial, he was found guilty and sentenced to four years' imprisonment. While awaiting trial he had succeeded in producing gold under strict supervision in the Munich Mint – but the evidence was contested in court and did not save him.

The same fate was to befall a Polish engineer named Dunikovski who, in the same year that Tausend was convicted, announced in Paris that he had discovered a new kind of radiation – 'z-rays' – which would transmute quartz into gold. The mineral, spread on copper plates, was melted by an electric discharge at 110,000 volts, and was then irradiated with the z-rays.

The world was becoming accustomed to new types of radiation with remarkable properties. x-rays had been discovered a few decades before. Three kinds of radiation – alpha, beta and gamma – had been identified in the emissions from radioactive substances. Intense 'cosmic' radiations had been discovered bombarding the Earth from space. Rays with miraculous properties were a staple of futuristic fiction. The public was ready to believe that gold-creating rays could exist – even if their nature was rather inadequately explained by Dunikovski. Investors poured some two million francs into his process.

But within a few months, when no gold was forthcoming, he also was tried and found guilty of fraud. After two years in prison his lawyer succeeded in obtaining his release, and Dunikovski went with his family to San Remo in Italy, where he resumed his experiments.

Soon there were rumours that he was supporting himself by the occasional sale of lumps of gold. His lawyer, accompanied by the eminent chemist Albert Bonn, set out for San Remo to see for himself.

It was found that the quartz being used by Dunikovski already contained minute amounts of gold; but whereas the usual methods of extraction produced gold in quantities of only 10 parts per million, Dunikovski's methods yielded almost one hundred times as much. Each experiment, however, involved only minute quantities of quartz, so the quantity of gold produced was very small.

In October 1936 Dunikovski demonstrated his process before an invited group of scientists. He was very secretive about his apparatus, but gave a theoretical explanation that is reminiscent of the primitive origins of alchemy. He proposed that all minerals contained 'embryonic atoms' undergoing a transformation that in nature took many thousands of years to complete. He claimed that his process merely accelerated the natural growth of embryonic gold in quartz.

Making gold from sand

The demonstration attracted considerable attention and an Anglo-French syndicate was formed, which was to bring sand from Africa and treat it in a big new laboratory on the south coast of England. But the Second World War broke out and little more was heard of Dunikovski. There were rumours that he had established a factory on the Swiss-French border, and there were stories that when the Germans occupied France they manufactured gold to bolster their failing economy – but there is no proof.

There have been, and still are, many more practitioners of alchemy in the 20th century. One was Archibald Cockren, who was killed when a bomb struck his tiny laboratory during the blitz on London. He was a respected osteopath who practised gold therapy. He began his investigations with the metal antimony, then turned his attention to iron, copper, silver, mercury and gold. Then:

> I entered upon a new course of experiment, with a metal . . .with which I had had no previous experience. This metal, after being reduced to its salts

Above: an engraving from the 17th-century alchemical work *Atalanta fugiens*, illustrating the ubiquitous nature of the Philosopher's Stone. It may be of significance that the form of the Stone shown here could represent crystals of salt or sand

Left: the Polish engineer Dunikovski, escorted by police officers, leaves the Paris polytechnic where he had been demonstrating his alchemical process while awaiting trial for fraud

Above right: wringing out canvas sheets that have been spread to collect the morning dew. This illustration is from the alchemical treatise called *Mutus liber*

Right: Armand Barbault followed the directions of *Mutus liber* in his 20th-century alchemical work

and undergoing special preparation and distillation, delivered up the Mercury of the Philosophers, the Aqua Benedicta, the Aqua Coelestis, the Water of Paradise. The first intimation I had of this triumph was a violent hissing, jets of vapour pouring from the retort and into the receiver, like sharp bursts from a machine gun, and then a violent explosion, whilst a very potent and subtle odour filled the laboratory and its surroundings. . . .

Whatever Cockren's true achievement, nearly all his discoveries were lost in the bomb blast that killed him. A liquid that he called 'oil of gold' was used in later years, however, for medical purposes.

Postwar alchemy

Since the Second World War, much of the publicly known activity in alchemy has been centred in France. Apart from Eugène Canseliet, who claimed to have been a pupil of Fulcanelli (see page 830), and who has been seen on television at work in his laboratory, there were others such as the writer Roger Caro and the painter Louis Cattiaux.

But undoubtedly the most notorious was Armand Barbault. An essential part of the Barbault process was the gathering of dew in canvas sheets every morning between 21 March and 24 June. This is not a new idea: it is shown in the wordless book of engravings known as the *Mutus liber* ('silent book'), and it is recommended by Salmon in his *Polygraphica*: 'If you are indeed an Artist, you may by this turn all metals into their first matter.' Barbault described his first matter as a 'germ', which grew in black earth.

It is time to ask whether there might be any truth in the tales of the alchemists. Did competent scientists such as van Helmont, Schweitzer and Boyle really witness the transmutation of a base metal into gold? Did Archibald Cockren isolate the ideal 'mercury' and 'sulphur' sought by the alchemists? And did Tausend and Dunikovski really succeed in producing gold from quartz?

Although the ancient alchemists could not possibly have had access to sources of energy sufficient to perform Rutherford's transmutation, perhaps they had some kind of intuitive understanding of what could happen. We wrote Rutherford's experiment as:

$$N(7) + He(2) = O(8) + H(1)$$

Now look at the three alchemical essentials postulated by Paracelsus: sulphur (symbol S, atomic number 16), mercury (symbol Hg, atomic number 80) and salt (sodium chloride, symbol NaCl – the atomic numbers of sodium and chlorine are 11 and 17, respectively). We can write a hypothetical reaction among these three as follows:

$$NaCl(28) + S(16) = NaS(27) + Cl(17)$$
$$NaS(27) + Hg(80) = Au(79) + NaCl(28)$$

Salt and sulphur are added together; chlorine gas is given off (to the alchemists this would simply have been 'air'); when mercury is added, the result is the original salt – and gold (Au).

The atomic numbers balance impressively. However, this is not the sort of reaction that ordinarily takes place in the chemical laboratory, where everything is either solid, liquid or gaseous. But there is a fourth state of matter, called plasma, in which atoms lose or gain electrons and can take part in chemical reactions that are impossible for them in their normal state. One of the easiest ways to produce a stream of plasma is to burn salt in the flame of the mundane Bunsen burner. Could this give a hint as to how the alchemists might have succeeded in bringing about 'impossible' reactions?

In our present state of knowledge, these are mere games with numbers. But they may bear further examination. Cockren began his research with antimony (Sb), but achieved his successes with 'a metal . . . with which I had had no previous experience.' He might have been referring to silicon (Si), which is not, in fact, a metal but a metalloid, belonging in a group of elements comprising carbon, germanium, tin and lead. It is the essential component of quartz, which is an almost pure compound of silicon and oxygen, silicon dioxide. We can easily write another 'Rutherford equation':

$$Si(14) + Si(14) + Sb(51) = Au(79)$$

A chance relationship among these atomic numbers? Or a guide to a possible gold-producing process involving silicon and antimony?

It seems improbable, despite the testimony that has accumulated over the centuries, that physical transmutation of a base metal into gold was ever achieved by any alchemist. But did those alchemists, striving to make themselves one with God, perhaps gain some intuitive understanding of the structure of matter? And when they described the Philosopher's Stone as 'the vilest and meanest of things . . . cast away and rejected by all', were they speaking of silicon dioxide – known to us as ordinary sand?

Further reading
Allison Coudert, *Alchemy, the Philosopher's Stone*, Wildwood House 1980
E.J. Holmyard, *Alchemy*, Penguin 1968
Stanislas Klossowski de Rola, *Alchemy*, Thames and Hudson 1973
F. Sherwood Taylor, *The alchemists*, Paladin 1976

Who was Kaspar Hauser?

Left: Bruno S as Kaspar Hauser in Werner Herzog's film, which was made in 1975. The enigmatic foundling is still a source of fascination, and numerous books have been written about him – yet his true identity has never been established

Below: the first attempt on Kaspar's life, at the home of his guardian Dr Daumer. The masked assailant struck Kaspar then fled, leaving the boy unconscious in the cellar

As Kaspar Hauser's fame spread, investigators doubled their efforts to piece together his background. But, as GRAHAM FULLER and IAN KNIGHT reveal, just as the puzzle seemed to be solved, Kaspar was brutally murdered. Who killed him – and why?

KASPAR HAUSER'S AUTOBIOGRAPHY, when it appeared in August 1829, proved something of a disappointment to the people of Nuremberg. It revealed nothing new about his background, but merely gave a more detailed account of his life in confinement, a story already widely known – and in some cases embellished by popular rumour to the extent that the facts seemed decidedly dull in comparison.

If the public felt at all cheated, however, it did not have long to wait for a new sensation. On 7 October 1829 Kaspar was found prostrate in Dr Daumer's cellar with a wound in his forehead. He was carried upstairs and put to bed, but little about the incident emerged beyond the fact that he had been hit by a man with 'a black face', which was taken to mean a man with a mask.

Nuremberg was aghast, taking the assault as proof that Kaspar had enemies in high places who were disturbed by the publication of his life story, and who feared it would let some secret slip. Anxious to avoid another attack on their most famous son, the town council moved Kaspar to an undisclosed address and provided a police guard. For two years the boy was surrounded only by his champions, but the novelty of supporting a celebrity on their taxes began to lose its appeal to the people of Nuremberg and several citizens complained about the cost.

Fortunately a solution was to hand. An English aristocrat, Lord Stanhope, had taken an interest in the case and wanted to adopt the youth. Nuremberg's councillors were prepared to allow Stanhope to assume temporary custody of Kaspar in return for a

contribution towards his upkeep. Stanhope, who seems to have regarded the boy as an unusual toy with which to amuse his friends, then took him on a tour of Europe and presented him at the courts of various minor principalities and kingdoms. It does not appear to have been a complete success, novel entertainment though Kaspar undoubtedly was, and certain members of the Bavarian royal house threatened law suits if their name continued to be linked with his. Meanwhile, Kaspar and Stanhope, wilful foundling and eccentric Englishman, began to quarrel. Finally, in 1833, Stanhope applied to the Nuremberg Council for permission to lodge Kaspar permanently in the town of Ansbach some 25 miles (40 kilometres) away, in the care of his friend Dr Meyer. The Nurembergers were reluctant to sever the tie completely, but Stanhope's influence was considerable and eventually they agreed.

Kaspar's tutelage began anew with Meyer. The doctor had him confirmed in the Protestant Church and attempted to school him in Latin and history as well as practical subjects. Kaspar did not thrive; he became introspective and moody, and seems to have resented the way Meyer treated him. No longer the centre of a crowd of admirers, he may well have simply refused to learn. Meyer pronounced in disgust that Kaspar's mental abilities had been grossly exaggerated and that he had the mind of an eight-year-old. Stanhope's interest began to fade.

Below: the fatal attack on Kaspar Hauser, as portrayed in Herzog's film. Kaspar managed to stagger home, but died from his wounds three days later, on 17 December 1833

Kaspar himself longed to return to Nuremberg and to the friends and supporters he had left behind there. He made one brief visit in 1833, which further fuelled this desire – but events overtook him.

On 14 December 1833 Kaspar Hauser staggered into Dr Meyer's house clutching his side. Gasping 'Man stabbed! Knife! Park! Gave wallet! Go quick!', he collapsed to the floor in a pool of blood.

For several days the people of Nuremberg and Ansbach held their breath. Kaspar lay seriously ill, the knife having entered the left side of his chest, damaging his lungs and liver. He did manage to reveal some details of the attack. A stranger – 'tall, with dark whiskers and a black coat' – had approached him and asked, 'Are you Kaspar Hauser?' When told that he was, the man promised to give information about the boy's family and led him to Ansbach's city park where he handed him a wallet. When Kaspar opened it the man stabbed him and ran off.

The police moved rapidly to catch the assailant, but he could not be traced. The wallet was found where Kaspar had dropped it, but all it contained was an enigmatic note. Written back to front, to be read in a mirror, it said:

> Hauser will be able to tell you how I look, whence I came from and who I am. To spare him the task, I will tell you myself. I am from . . . on the Bavarian border . . . on the river. . . . My name is MLO.

Death of an enigma

The nonsensical nature of this message led some to believe that Kaspar had fabricated the attack. Captain Hickel of the Ansbach police questioned the boy as he lay wounded, but all he would say was, 'I didn't do it myself.' These were to be his last words. The wound set up complications, and on 17 December 1833 Kaspar Hauser died.

The public, throughout Bavaria, was outraged, and large rewards were offered for any information concerning the identity of the assassin. None was forthcoming. When huge crowds followed Kaspar's body as it was taken to its last resting place, they saw it buried beneath a headstone that ably summed up his life: 'Here lies Kaspar Hauser, the riddle of his time. His birth was unknown, his death mysterious.'

The strange circumstances of his murder strike right at the heart of the mystery that surrounds Kaspar Hauser. His last guardian, Dr Meyer, was convinced that the boy had inflicted the wound on himself to attract attention, possibly with an eye to getting himself returned to Nuremberg, but that the dagger had done rather more damage than Kaspar had expected. Certainly there were no witnesses to either of the attacks upon Kaspar, and both wounds could have been self-inflicted. It was reported that police investigating the scene of the fatal assault scoured the Ansbach gardens but found no footprints other than Kaspar's. And the timing, too, may have been significant. The first attack took place following the disappointment of Kaspar's autobiography, which it soon overshadowed, and the second attack

occurred when his fame was beginning to wane – instantly, and ironically, bringing his name into the limelight once more.

But perhaps Kaspar's enemies wanted him dead. Many of his friends argued that he was the victim of a conspiracy. Someone with something to hide, they said, had ordered the first attack to cast doubts on his credibility, or more likely to warn him to keep his mouth shut; with the second they silenced him forever. If the attacks were linked, they suggest a motivating party with enough influence – and reason – to have Kaspar followed over a period of four years and then eliminated. The assault in Daumer's house could have been a bungled murder attempt, the would-be assassin panicking and fleeing when Kaspar cried out. Since Kaspar was seldom left alone, his killer would have had to wait perhaps years to find the right moment to strike, which could partly explain the great length of time between the attacks. If the motive of the murder had been to silence Kaspar, then it is also worth considering that several prominent Nurembergers, including Bürgermeister Binder, died in mysterious circumstances in the years following Kaspar's death. What had Kaspar told them?

'Citizen of another planet'

Lastly, there is the possibility that Kaspar Hauser was murdered by the man who had raised him, whoever that might have been. Kaspar's descriptions of his assailants were vague, but the masked man who tended to him in childhood might easily have been the same man with 'a black face' who attacked him at Daumer's house, or the man 'with dark whiskers and a black coat' who finished him off. If so, motivation is harder to find: if Kaspar came from a family of no particular note, why should the man have felt the need first to release him and then to kill him? And what was the significance of the bizarre murder note? Did it have a meaning in the eyes of a royally paid assassin, or of an ex-soldier of the 6th Cavalry? Or was it purely intended to throw the police off the track? No rational motive can easily be found, although of course murder is not always a rational business.

All the unknown quantities concerning Kaspar Hauser's brief life, and the five years he spent in the public eye, have continued to fascinate investigators. The original accounts of his appearance and behaviour have been meticulously studied, and inconsistencies exaggerated beyond all importance. A comment by Anselm von Feuerbach, a patron in Ansbach, has even been taken as proof of an extra-terrestrial connection:

> Kaspar Hauser showed such an utter deficiency of words and ideas, such perfect ignorance of the commonest things and appearances of Nature, and such a horror of all customs, conveniences and necessities of civilised life, and, withal, such extraordinary peculiarities in his social, mental and physical disposition, that one might feel one's self driven to the alternative of believing him to be a citizen of another planet, transferred by some miracle to our own.

Kaspar Hauser's life has been the subject of books, novels, plays and a film (Werner Herzog's *The enigma of Kaspar Hauser*, made in 1975), each with its own contribution to make to the nature of the mystery.

But the question remains: who *was* Kaspar Hauser?

Top: the monument marking the spot where Kaspar was stabbed in Ansbach park

Above: the last resting place of Kaspar Hauser, 'the riddle of his time. His birth was unknown, his death mysterious'

Further reading

Carlo Pietzner, *Kaspar Hauser, the child of Europe*, Rudolf Steiner Library 1965
Jacob Wasserman, *Caspar Hauser, the enigma of the century*, Rudolf Steiner Publications (New York) 1973

Post script

Your letters to THE UNEXPLAINED

Dear Sir,
About six years ago, my husband and I were motoring through Germany. It was late autumn and the days were short; one evening we found ourselves in the Eifel Mountains, close to the Luxembourg border, with the light fading fast and nowhere to stay. We were very tired, and agreed to stop at the first guest house we saw.

This turned out to be a small, isolated 'Gasthof' – there wasn't another house in sight, only dark forests and hills all around. The people, however, were very nice, the bedroom was large and quite comfortable. After a pleasant supper, we retired early and fell asleep at once.

About half past two I awoke quite suddenly. The room was pitch dark, but while I was staring at the darkness, *hands* suddenly appeared. White hands, dozens of them, and all in pairs. Some were young, almost childish, some old and mis-shapen, and some long and slender. They were everywhere: above the bed, by the door, near the ceiling and even just above my face. There was no other part of anybody to be seen – but each pair of hands was squeezing, wringing and clasping together, as if in the most terrible distress.

And then the whispering started. From every corner of the room and in various tones came the whisper, 'Rose Müller, Rose Müller'. It was repeated over and over, not in unison – each ghostly voice held such despair that I was terrified.

I woke my husband. He switched on the light and we saw that the door was still locked (we had made sure it was locked before getting into bed) and the key was on the bedside locker. He opened the door and looked out on the corridor, but there was no sign of life anywhere.

The next morning at breakfast, we tried with the little German we had to find out who 'Rose Müller' was, and what had happened to her.

I have never seen people change so quickly. Our bill was brought immediately, the proprietor and his wife seemed as if they couldn't get rid of us quickly enough, and all the smiling welcome disappeared. They were obviously distressed and didn't understand that I had never even heard the name 'Rose Müller' before that night, and that I felt only compassion and sorrow for whatever had apparently happened at some time previously in that room.
Yours faithfully,
Mary Taylor Milton Keynes, Buckinghamshire

Dear Sir,
May I relate an astral projection that happened to me early one morning? I was lying in bed on my stomach when a pair of large hands pressed the small of my back and immediately my astral body separated from my physical body and rose, in a horizontal position. I was able to see my physical body lying in bed, as solid as I am now. I landed gently on my feet in a standing position, and at the same time I became conscious of a hissing noise.

While this was going on, a large balloon, pink in colour, was growing out of the mouth of my astral body. The hissing continued while the balloon grew larger and larger. I began to be concerned that the balloon might blow up in my face. This thought seemed to break the experience, and I felt myself returning to my physical body.
Yours faithfully,
K. Rendall Newcastle-upon-Tyne, Northumbria

Dear Sir,
We have one daughter, aged 11. In 1976, when she was six years old, I went upstairs one evening to check she was sleeping peacefully. When I went inside her room, I saw that her face, hair and bedclothes were covered in blood. In a panic, I called my husband, who was downstairs – but by the time he reached the bedroom, my daughter was perfectly all right – there was no blood anywhere.

Exactly 24 hours later when he went to check she was all right, she *was* covered in blood, just as I had 'seen' the night before. This time I didn't panic, I just cleaned up the blood and in the morning I took her to the doctor. He said she had burst a blood vessel in her nose; this isn't serious, but it makes a lot of blood.

Now I know this to be a case of precognition – but it seems strange that it was such a terrifying vision of something that actually turned out to be harmless!
Yours faithfully,
Jennifer Bollington (Mrs) Eastbourne, Sussex

Dear Sir,
I should like to tell you of a dream – it was the strangest dream I ever had, and I dreamed it in identical detail on three successive nights.

I was in hospital in the Middle East. I had some kind of leg injury, and was being cared for by one particular Arab nurse; her face was so clear that, if I had been an artist, I could have painted her portrait.

That was in May 1978, and within a few months my dream came frighteningly true. During the summer I was offered a plumbing contract in Kuwait – part of the construction of a new army camp.

The first few weeks in Kuwait passed without mishap, and I almost forgot the dreams I had had back home in England. Then, one September day I was fitting a supply pipe when I disturbed a deadly sidewinder snake in the sand. It bit me in the right knee, and my leg felt as if red-hot needles had been plunged into it.

I was driven to the local hospital, where we were told there was no equipment adequate to treat me, and then to a bigger hospital in Kuwait City. By this time I was delirious.

When I regained consciousness, I was having my pulse taken by an Arab nurse – whom I recognised as the nurse of my dream. On seeing her I thought I'd arrived at wherever you go when you die. It was only when she said 'You are in Al Sabuh Hospital' that I realised I was still alive.

After another injection, I began to feel better, but the doctor insisted I stay in hospital for three days – just as my dream had occurred on three successive nights. On the way back to the site, my work-mates told me just how narrow my escape had been. If I had reached the hospital 15 minutes later, I would have been dead.
Yours faithfully,
Ifor Jones Bargoed, Glamorgan

Send *your* letters to THE UNEXPLAINED, Orbis House, 20–22 Bedfordbury, London WC2N 4BT


THE WORLD'S MYSTERIOUS PLACES – 20
The temples of Mnajdra, Malta